MUSES-C: A Near-Earth Asteroid Lander and Sample Return Mission

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The MUSES-C mission to a near-Earth asteroid is a collaborative effort between Japan's Institute of Space and Astronautical Science (ISAS) and NASA. Launch is scheduled for January 2002 with arrival at the asteroid in April 2003. The mission target is currently 4660 Nereus with 1989 ML serving as an attractive back up option. After an initial reconnaissance of the target body, the Japanese spacecraft will alight upon the asteroid's surface up to three times and collect surface samples for return to Earth in January 2006. Before departing the asteroid, this spacecraft will also deploy, and relay signals from, a NASA provided miniature robotic rover designed to operate in the micro-gravity environment on the asteroid's surface. The rover will carry a panoramic and near-imaging camera with an eight position filter wheel; this camera is capable of spatial resolutions better than one mm. In addition, the rover will carry a near-infrared spectrometer (0.9 - 1.7 microns spectral range) and an alpha x-ray spectrometer for making elemental abundance measurements at various selected sites. The Japanese spacecraft will carry a multi-band imaging camera, a near-infrared spectrometer (0.85 - 2.1 microns), an x-ray spectrometer for elemental composition measurements, a LIDAR and a sophisticated surface sample acquisition mechanism. The MUSES-C suite of science instruments will provide both remote and surface measurements of the asteroid's morphology, mineralogy, and elemental composition. In addition, the few grams of surface samples returned to Earth in 2006 will allow extensive studies to be undertaken in Earth-based laboratories for years after the project is complete. This challenging mission will also test a number of new technologies including solar electric propulsion, autonomous landing and sampling, and the hyperbolic re-entry of the sample return capsule at Earth. As the first asteroid sample return mission, this collaborative mission will utilize state-of-the-art technologies to provide an extensive and cost-effective investigation for one of Earth's closest neighbors.

asteroid sample return

solar sample return